NON-PUBLIC?: N
ACCESSION #: 9005090083
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Millstone Nuclear Power Station Unit 3 PAGE: 1 OF 5

DOCKET NUMBER: 05000423

TITLE: Manual Reactor Trip Due to Imminent Loss of Condenser Vacuum
EVENT DATE: 03/30/90 LER #: 90-011-00 REPORT DATE: 04/20/90

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 080

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Nelson D. Hulme, Senior Engineer x5398

TELEPHONE: (203) 447-1791

COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On March 30, 1990 at 1328 hours with the plant at 80% power in mode 1, a manual reactor trip was initiated due to an anticipated turbine trip from a loss of condenser vacuum. Prior to the trip, the intake structure screen wash system was removed from service to install a repaired elbow. The installation was planned for three hours. The installation would have restored the second 100% screenwash pump to service before the seasonal (i.e., April 15 - May 30) high seaweed loading began. However, the effort to manually clear the screens was not enough to prevent two Circulation Water Pumps from tripping.

The root cause was the failure to collect the debris from the manual screen washing, The debris recirculated into the intake stream on the tide change. Also, a major factor that prevented clearing the screens rapidly was the inability of operators to manually run the screens at any

speed other than slow. In the future, an,, temporary systems used in place of the screen wash will include debris collection. Otherwise, maintenance requiring the screenwash to be turned off will be scheduled during a unit shutdown.

END OF ABSTRACT

I. Description of Event

On March 30, 1990 at 1328 hours with the plant in Mode 1 at 80% power, at 5800 Fahrenheit and 2250 psia, a manual reactor trip was initiated because of an anticipated turbine trip due to loss of condenser vacuum. Prior to the trip, the intake structure screen wash system was removed from service to install a repaired elbow. This required that the screen wash system be placed out of service, and manual washing of seaweed from the traveling screens. A rapid buildup of seaweed resulted in the automatic trip of Circulating Water Pumps 3CWS-P1A and 3CWS-P1B due to high screen differential pressure (DP). Because a low condenser vacuum was anticipated, a reactor trip was initiated. This trip caused a Main Turbine and Generator trip in accordance with design. All safety systems were fully operable at the time of the trip except that Containment Recirculation Pump 3RSS*P1C which had a high oil level in the lower motor bearing and Containment Recirculation Pumps and Coolers Area Air Conditioning Unit 3HVQ*ACUS2A were temporarily removed from service to perform planned maintenance. The unavailability of the safety-related equipment did not affect this event, and it did not present any danger to the health and safety of the public.

On March 10, 1990, the screen wash system was temporarily placed out of service in order to remove a cracked piping elbow located downstream of Screen Wash Pump 3SWT-P1A, and to install a blank flange on the main header side of the removed elbow. The flange was installed so Screen Wash Pump 3SWT-P1B could provide flow for the screen wash system. The unit was not operating during the time the screenwash elbow was being removed. Inspection of the elbow indicated replacement rather than repair was needed. By the time a replacement was available for installation, the plant had been returned to full power. Therefore, it was not possible to stop the screen wash system without either providing alternate method for removing debris from the traveling screens.

Normally, installation of the new elbow would have been deferred until a plant shutdown or significant reduction of reactor power

could be accomplished. However, the seasonal increase in seaweed loading at the intake structure was expected. The installation was planned for three hours. The installation would have restored the second 100% screenwash pump to service before the seasonal (i.e., April 15 - May 30) high seaweed loading began. Manual cleaning was started to ensure the method would effectively clean the screens. The screen wash system was available during the evaluation period. The manual method to clean screens during the installation did not collect the debris, but returned it to Long Island Sound to the West of the intake. The uncollected debris was brought into the intake stream by the tide change. The total debris exceeded the capacity of the traveling screens. A power reduction was in progress when the differential level across the screens tripped the "A" and "B" Circulating Water Pumps. The operators manually tripped the reactor to avoid a challenge to the Reactor Protection System.

1. Description of Event (Continued)

The following is a synopsis of the events between the screenwash system shutdown and the reactor trip.

Time Event

1216 With personnel stationed at the traveling screens manual control buttons and manning fire hoses, 3SWT-P1B was stopped and the cleaning operation was started. Reactor power at this time was 100%.

1226 After it was confirmed that manual cleaning was successfully removing debris, maintenance personnel were released to begin removal of the blank flange and reinstallation of the elbow.

1320 "A" Bay Traveling Screen differential level started to increase. A reduction of Main Turbine load was started. A few moments later, the "B" Bay Traveling Screen differential level also started increasing.

1327 "A" Circulating Water Pump tripped due to high traveling screen differential level.

1328 "B" Circulating Water Pump tripped due to high traveling screen differential level. With reactor power at 80%, the reactor was manually tripped.

approx.1345 The elbow for 3SWT-P1A was installed and the screen wash system was returned to service.

At the time of the trip, operators verified that the Reactor Trip and Bypass Breakers were open, that all control rods were fully inserted, and that neutron flux was decreasing. A Feedwater Isolation was received due to low Average Reactor Coolant System temperature following the trip. An Auxiliary Feedwater actuation occurred as a result of a steam generator low-low level signal. These are normal plant responses following a trip. No additional Engineered Safety Features were required or initiated.

At 1340, the trip resulted in the separation of the thermal relief valves for 1A and 1C Feedwater Heaters where the relief inlet pipe connects to the heater. The Turbine Building was evacuated and access restricted until it was determined that there was no longer a personnel hazard. No one was injured as a result of the relief inlet pipe failures, and Turbine Building access was re-established within approximately 30 minutes of the event. No safety related equipment was affected.

II. Cause of Event

The root cause was the failure to collect the debris from the manual screen washing. The debris recirculated into the intake stream on the tide change. Also, a major factor that prevented clearing the screens rapidly was the inability of operators to manually run the screens in fast speed.

III. Analysis of Event

This event is being reported in accordance with 10CFR50.73 (a) (2) (iv), as an event or condition that resulted in manual actuation of an Engineered Safety Feature. Immediate notifications were performed in accordance with 10CFR50.72(b)(2)(ii).

The safety significance of the event was minimal in that the trip was manually initiated when a Turbine trip was imminent. Except for separation of the thermal relief valves inlet piping from Feedwater Heaters 1A and 1C, all plant systems performed as designed in response to this occurrence and the event posed no danger to the health and safety of the public. The precise cause for the relief inlet pipe fractures is not known at this time. Preliminary

analysis indicates that pressure surges from the rapid closure of the feedwater isolation valves contributed to the piping failures. Pending a determination of root cause and corrective action for the fractures, the reliefs inlet piping and associated supports have been modified to reduce the piping stresses of feedwater isolation pressure surges.

Operation of the Service Water system was not jeopardized due to the ratio of Service Water System flow (approximately 15,000 gallons per minute) to circulating water pump flow (approximately 150,000 gallons per minute) for one bay. When a circulating water pump trips, there is a reduction in flow resistance through the blocked screens. This allows differential level across the screens to return to an acceptable value. A unit downpower, using the rod control and steam dump systems, was considered as potential corrective action during extreme weather conditions. The intent would be to reduce unit output below 50% power, where a turbine trip would not result in a reactor trip. But due to an interlock which prevents steam dump operation on loss of condenser vacuum, a power reduction below the turbine trip/reactor trip setpoint would still result in a reactor trip.

IV. Corrective Action

The elbow was replaced and automatic screen wash was restored. The screen wash system will not be deliberately removed from service while the plant is at high power levels until a more effective means of manually clearing debris from the traveling screens is developed. As an immediate corrective action, the traveling screen controls have been modified to allow manual fast as well as slow speed operation. In addition, any temporary systems used in place of the screen wash will also include debris collection. Otherwise, maintenance will be scheduled during a unit shutdown.

V. Additional Information

Licensee Event Reports (LER) number 86-035, 88-014, 88-024, and 89-008 are similar in that a reactor trip due to a turbine trip resulted when fouling of the intake screens caused circulating water pumps to trip causing condenser vacuum to decrease, As discussed in LER 89-008, a Task Force was formed to examine the problems with the intake structure. The Task Force made recommendations and developed an action plan that will incorporate the recommendations over the next 18 months.

Several immediate actions have been taken to improve screen wash

system effectiveness, and to improve the efficiency of debris removal.

o Maintenance has been performed on screen wash system strainers and automatic valves to ensure proper operation.

o Screen wash spray piping has been removed, cleaned, and reinstalled.

o Where appropriate, spray nozzle size has been increased to improve performance and reduce the likelihood of the nozzles becoming blocked.

o Rubber guides have been installed on traveling screen trash troughs to assist the screen wash in removing debris completely from the screens. The root cause for separation of the relief valves for Feedwater Heaters 1A and 1C is still under investigation.

EIIS CODES

Systems Components

Circulating Water System - KE Pumps - P
Traveling Water Screens -SCN
Condenser - COND

ATTACHMENT 1 TO 9005090083 PAGE 1 OF 1

General Offices o Selden Street, Berlin Connecticut

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April 30, 1990
MP-90-417

Re: 10CFR50.73(a)(2)(iv)

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Reference: Facility Operating License No. NPF-49
Docket No. 50-423

Licensee Event Report 90-011-00

Gentlemen:

This letter forwards Licensee Event Report 90-011-00 required to be submitted within thirty (30) days pursuant to 10CFR50.73(a)(2)(iv), any event or condition that resulted in manual actuation of the Reactor Protection System (RPS).

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

FOR: Stephen E. Scace
Director, Millstone Station

BY: John P. Stetz
Millstone Unit 1 Director

SES/NH:tp

Attachment: LER 90-011-00

cc: T. T. Martin, Region I Administrator
W. J. Raymond, Senior Resident Inspector, Millstone Unit Nos. 1, 2 and 3
D. H. Jaffe, NRC Project Manager, Millstone Unit No. 3

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